DAQ Comments

The speed of 20 mph will be the assumed average travel speed under all conditions for local streets since local class facilities are not modeled directly as part of the travel model network.

[What about weather effects (fog, snow, etc.)?] -

There is no snow reported on the episode days. The travel model is designed to represent typical weekday conditions, therefore, fog, snow, rain etc. are not included.

The VMT and speed resulting from each time period will depend on the number of vehicle trips assigned for that time period. The percentage of trips for each time period is derived from national data as well as local home interview data. The percentage of trips in each of the four periods will vary by area. The AM Peak and PM Peak periods will be the peak 3 hour periods, the mid-day period will run from the end of the AM Peak to the beginning of the PM Peak. The off-peak will cover the remainder of the 24 hour period.

[What about the percent increase in heavy-duty diesel traffic during the nighttime hours as discussed by EPA?] -

I am not aware of this discussion. We do not have daily VMT mix data for the urbanized areas or the rural areas, let alone hourly VMT mix.

The speed data will then be used as input to the MOBILE5b model to determine emission rates.

Travel Demand Model Data Sets & Components

The primary inputs to the modeling process are data sets describing the characteristics of the transportation system (commonly referred to as networks) and existing or future population and employment.

Highway Network and Characteristics

Highway networks describe the location of streets and highways other than local streets, their capacities, and speeds. The data is in GIS format as a set of links and nodes. ***[Define "link".]***

A node represents a point on the highway network and could be an intersection of two or more streets, an access point where TAZ centroids are connected to the highway network, or a point along a street where the characteristics of the facility change such as the number of lanes, or the posted speed. Links are defined by two nodes. Links represent highway segments and have attributes such as functional class, distance, speed, capacity, and volume.

The inventory of current network characteristics is updated regularly based on local data as well as the FHWA Highway Performance Monitoring System (HPMS).

Functional Classification

The characteristics of streets and highways vary significantly according to the function the street performs. The characteristics which vary include speed, which is integral to the projection of emissions.

The FHWA Functional Classification System defines the role that each street, road and highway will play in moving traffic from trip origins to destinations. This data is compiled in accordance to the Highway Functional Classification – Concepts, Criteria & Procedures –1989 by USDOT, FHWA.

Each auto trip has two separate needs, access to transportation facilities at its origin and destination points, and mobility between them. Access is best provided by streets with driveways and parking convenient to origin or

destination of each traveler. Mobility is best provided by controlled access highways where there is minimum interference with the main traffic flow from side traffic. The best providers of mobility are freeways which provides full control of access, allowing smooth flow of through traffic with minimum disruptions by traffic entering or leaving the system. Freeway on and off ramps are a special class of freeway facilities.

Since it is impossible to build a freeway between each origin and destination a compromise is needed, one that will provide the best practical balance between serving access and mobility. Principal Arterials are designed to serve mainly a mobility role but still allow access to many bordering activities. Minor Arterials connect with and augment the Principal Arterials to carry mobility-oriented traffic between smaller areas and allow an even greater degree of access. Collectors connect scattered developments and suburban neighborhoods and provide access to activities along their routes. Finally, Locals principally provide access to roadside activities, homes, stores, business locations, etc. In combination, the network formed by these various functional classifications accommodates the highway travelers' needs.

The ~~emission projections~~ travel characteristics (especially speed and function) for principal and minor arterials and collectors are very similar and therefore are combined into the single category "arterials". The result is separate VMT and speed projections for freeways, ramps, arterials and locals. ***[Why are these projections combined into the single category "arterials"?]***

Speeds

Emission rates vary with the speed of vehicle. Speeds vary across functional classes and vary according to the degree of congestion. The free flow speeds used in the model are based on posted speeds and speed studies. Congested speeds are estimated by travel demand forecasting model based on the ratio of estimated volume to capacity. ***[Why are congested speeds not based on studies such as "floating car studies"?]*** **-**

Because the model needs a mathematical means to calculate congested speed based on capacity and demand.

Speeds will be estimated for each of the four classes of facilities and for AM-peak, mid-day, PM-peak, and free-flow periods.

Capacity

The 1994 Highway Capacity Manual is used to estimate capacity. ***[Is there a newer Highway Capacity Manual than 1994?]*** **-**

No.

The functional class and number of lanes determine the highway network facility's capacity. A summary of the capacities used is given below.

Transit Network
The Transit network is a representation of the existing or proposed transit system. The modeled bus system includes service characteristics, such as bus headways (frequency), stops, and transfer opportunities. Transit networks are generally built "on top of" highway networks. Bus routes are described by the nodes of the highway network that the bus would pass over. For transit facilities such as bus way or grade-separated rail lines that do not use the street system, transit only links and nodes are added to the underlying highway network.

Transit access links are added to describe the walk or drive access to transit stations or bus stops. Transit access links are necessary to accurately represent the travel impedance of transit trips. ***[Define "impedance".]***

- Impedance is a measure of the resistance to traveling, typically a combination of time and cost.

As is the case for highways, MAG and WFRC have developed transit networks which represent the service provided by UTA in 1996. The networks include bus service provided within the three urbanized areas as well as the service between the areas.

Future year networks will be based on the long range plans developed by MAG, WFRC and UTA and will include future bus service and the existing and proposed rail lines.

Model Components

The Four-Step Process

Most metropolitan areas throughout the country use a similar approach to simulate regional travel behavior. This approach is known as the "four-step process" because it consists of four distinct procedures: Trip Generation, Trip Distribution, Mode Choice, and Traffic Assignment. The travel demand models are updated regularly in an incremental fashion and the models used for the PM10 SIP update will be the models as they exist on March 1, 2000.

Step Two - Trip Distribution

For work trips the impedance measure is congested times. The congested times are calculated by using the congested time from a 24 hour assignment. Volume to capacity ratios and congested speeds are calculated using a factor of 0.12 to convert hourly capacities to daily capacities. ***[Where does the factor of 0.12 come from?]***

- Highways do not operate at capacity 24 hours each day. Experience has shown that the ratio of hourly capacity to "daily" capacity is about 0.12. However, this paragraph referring to daily capacity will be deleted since assignment will be based on the four time periods discussed elsewhere, rather than a daily assignment.

Step Three - Mode Choice
This step of the process determines the probable mode of travel taken by each traveling individual. It is commonly referred to as modal split. Members of the traveling public are assumed to choose from the following transportation modes for each trip: (1) take public transit; (2) drive alone in an auto, van or truck; (3) car pooling in similar vehicles; (4) travel in a non-motorized mode such as walking or bicycle. The model assumes that their choices are based on the relative availability and attractiveness of each mode. Factors considered in the attractiveness of the mode include:

- Accessibility to mass transit
- Automobile ownership
- Costs required to use the mode
- Time required to use the mode
- Pedestrian friendliness
- ***[• Weather-related factors such as season, temperature and meteorology]***

- These factors are not part of the mode choice model.

The cost variables represent "out of pocket" costs, including public transit fares, the price of gasoline, parking and a mileage rate for driving. Time variables include time spent waiting for transit, time transferring between routes, or time spent driving and parking the car in order to reach the final destination. The mode choice factors are arrayed in an equation that estimates the probability of each traveler selecting each mode, given the characteristics of both the mode and the traveler.

The model used is a nested logit model. ***[Define "logit".]***

- A logit model is a mathematical device that measures the likelihood of choosing between two options. The choice may be based on any number of factors such as travel time, cost, wait time, transfer time, parking time, and automobile availability; but the result must be one of two choices. In order to represent more than two choices, the logit models must be nested.

Mobile Source Emissions Inventory Protocol
Part II: MOBILE5b Application

Overview

[The entire section labeled "Overview", which runs about two pages, should be reorganized and combined with the text on the opening pages of Part I (see pp. 1 through 3). Much of the discussion under "Overview" is redundant and was already discussed in the opening of Part I.]

- Subsequent draft will restructure redundant areas (that were created separately) and apply outline format.

Speed and functional class data will also be input to the PART5 model to determine particulate and sulfate emission rates in grams/mile. ***[In addition to the MOBILE5b and PART5 input files found in the Appendices, create a table that shows each model input with a label that clearly identifies that input. Otherwise, readers unfamiliar with the MOBILE5b and PART5 models will not be able to understand what the input values mean. Place this table in the Appendices.]***

- Will reference MOBILE5b and PART5 documentation to be posted on DAQ website.

During the hours from 11:00 pm to 6:00 am it is reasonable to assume that *XX%* of the free flow VMT is distributed evenly over this seven-hour period. ***[This statement is unclear: what's the value of XX? Are the hours of 11 pm to 6 am supposed to be included under free flow? If so, then add these hours to the table (now on p. 3).]***

-Will clarify the time periods. The value of XX is protected as corporate intellectual property. A recently developed matrix of public access XX values, stratified by metropolitan area, time of day, trip purpose, and trip direction, will be included in the next draft.

For spatial allocation of emissions, WFRC and MAG will provide to DAQ a geographic information system (GIS) data file containing traffic network link based data including coordinates, vehicle miles of travel, functional class, and corresponding emission rate for the functional class and time period in question. For each link there will be 20 different emission rates representing each of the four time periods (speeds) and each of the five different pollutants (VOC, CO, NOX, SOx, and PM) will be given. ***[In addition to the 20 different emission rates, there should be a way to divide the average daily VMT into four categories for each link. For example, a freeway link at the I-15 - I-215 interchange may have A.M. and P.M. peak VMT equal to 75% of the daily total, a midday VMT of 20% and a nighttime VMT of 5%, while an arterial in the south valley area***
might have A.M. and P.M. peak VMT equal to 60%, a midday VMT of 30% and a nighttime VMT of 10%. This would have implications for when and where emissions are injected into the modeling domain.

- Based on trip making data from the 1993 home interview survey, a percentage of daily trips by purpose will be assigned to each of the four time periods. The result will be a speed and volume for each link and each time period. Each unique speed will have a unique emission rate.

It would be good to have a little more background information on MOBILE5/6 and PART5, specifically: 1) a synopsis of the issues involving why we are not running the MOBILE model on a link-by-link basis; 2) the difference in model design between MOBILE5 and 6 (regional versus link appropriateness); and 3) the uncertainty with emission factors in PART5.]

- The MOBILE5 model is not applied on a link-by-link basis because it is not intended to be applied at that level of detail. It is a regional vehicle emissions model. If this changes for MOBILE6 I am not aware of it. If such a discussion between MOBILE5 and MOBILE6 exists I would like to review it.

Diesel Inspection/Maintenance Programs

Salt Lake, Davis, and Utah counties each have diesel I/M programs. A smoke opacity test is performed on all vehicles registered in these counties regardless of vehicle weight or model year. At present, EPA does not recognize any credit for diesel testing. ***[See Jeff Houk's comment in his e-mail dated 2/3/2000 (2:24p). EPA might allow a small amount of credit (on the order of 1-3%) for the diesel I/M programs, but not 20% as estimated in the original PM10 SIP.]***

- This is a control strategy issue or post model adjustment. There is no way that I know of to measure the effectiveness of diesel I/M using the MOBILE model.

The default silt load parameters included in the PART5 model will be used. Sonoma Technologies is conducting a literature research to determine silt load factors used in other localities. If a silt load factor is found which is believed to be more appropriate than the national default, the resulting impacts on the inventory will be evaluated and presented to EPA for approval. ***[Modeling work performed in the past used various different silt-loading factors (gm/m2) and silt content values (%). There really is no default set of values. Note that even the well-defined road types, such as freeway, showed a wide range of silt loading factors, e.g., from 0.011 to 0.126 gm/m2. The use of specific silt factors should be discussed.]***

- The silt loads being used are freeway (& ramp) - 0.10 g/m2, arterial - 0.14, and local 0.29.

Davis County

In 1998 Davis County initiated a hybrid I/M program called "DC98". The plan takes advantage of "on-board diagnostics" (OBD) which is a standard feature of 1996 and newer vehicles. OBD is a self diagnosing electronic system which a technician can use to quickly identify any emission control devices that may be malfunctioning. The DC98 program requires vehicles 3, 6, and 9 years old to be tested at a centralized test facility using a loaded mode (dynamometer) test equivalent to the IM240 test. Model year 1996 and newer vehicles tested at the Center are given the OBD test rather than the loaded mode test. All other vehicles in the program are given a basic two-speed idle test at a decentralized, "test and repair" station.

Because the DC98 program is a hybrid program, it cannot be modeled in a single run with MOBILE5b. The DC98 program involves two different test types, plus a given vehicle receives a different type of test every three years. The Division of Air Quality conducted an elaborate modeling process of several MOBILE5ah runs and came up with composite emission rates for the DC98 program. This modeling process was greatly simplified by using a spreadsheet (DVFACTOR) devised by DAQ which places the composite emission rate between the rates calculated for a basic I/M program and that calculated for an enhanced IM240 program. This procedure was approved by EPA. ***[Need to discuss how MOBILE5b fits into this - why didn't DAQ use MOBILE5b to perform multiple runs, and will "DVFACTOR" work with MOBILE5b?]***

- MOBILE5ah and MOBILE5b should produce nearly identical emission rates. We are not applying MOBILE5b in a different way than 5ah has been used other than to model beyond the year 2030. Can basic and enhanced I/M programs be modeled simultaneously with MOBILE5b, or do these I/M programs need to be modeled successively?

Salt Lake County

Salt Lake county employs a hybrid Acceleration Simulation Mode, two cycle (ASM2) I/M test. There is one small difference in the Salt Lake program that makes it a hybrid of the standard ASM2 test. The difference is that vehicle models 1989 or older are administered a less stringent anti-tampering inspection. For this reason, DAQ evaluations of vehicle emission rates in Salt Lake county have involved an elaborate combination of seven different MOBILE5ah runs resulting in a single composite emission rate. Upon closer inspection it was found that the composite emission rate differed very little from the "Option ASM2" and "Option ASM3" and "Option ASMp" runs as explained in the Technical Support Document for the 1997 Ozone SIP. The "Option ASM2" run was selected as the best single run corresponding to the composite emission rates. "Option ASM2" assumes minimal anti-tampering for all model years. ***[Similar to Davis County - need to address MOBILE5a_h/MOBILE5b relationship, etc.]***

[ASM2 is a theoretical ATP program that applies the anti-tampering program to vehicles of model years 1984-on only.]

-The hybrid ATP program in SL has a minuscule impact on emission rates, 1 or 2 milligrams if any. MOBILE5ah and MOBILE5b should produce nearly identical emission rates.

Utah County

The Utah County I/M Program is a decentralized test and repair network with a two-speed idle test on all gasoline vehicles 1968 model year or newer. The program was recognized by EPA as a test only network in 1998.

Effective February 29, 2000, the Utah County I/M Program will consist of a two-speed idle test on all gasoline vehicles of model years 1968 through 1995. OBD test will be done on all gasoline vehicles model year 1996 or newer. For the first year of OBD testing, if the vehicle passes the OBD test it will be given a certificate of compliance for registration purposes. If a vehicle fails the OBD test then it must pass the two-speed idle test in order to receive a certificate of compliance.

In the year 2001 the EPA will require OBD testing on all vehicles model year 1996 or newer. At that time, only those vehicles of model year 1996 or newer that are not OBD compliant will receive a two-speed idle test. ***[The preceding sentence states that ONLY those vehicles of model year 1996 or newer...will receive a two-speed idle test. That implies that no testing of model year vehicles 1995 and older would be required.***

Is that the intended meaning?]

- No. Read again. MAG will clarify if needed.

In the year 2000, the county will utilize remote sensing to identify gross emitters and for clean screening. Gross emitters are defined as vehicles that emit 5% CO or greater, as identified by remote sensing. These vehicles will be required to pass the appropriate vehicle emission cut-points using the appropriate test for their model year and weight. Vehicles that register 0% CO by the remote sensing equipment are considered clean and may be mailed a certificate of compliance for registration purposes. ***[What about the tailpipe test for hydrocarbons (HC, also known as volatile organic compounds)? Will these vehicles be required to undergo a test for HC emissions?]***

- These vehicles will be required to pass the appropriate vehicle emission cut-points...

Non-I/M Counties

Vehicles from the rural portion of the study area outside Salt Lake, Davis, Weber, and Utah Counties are not subject to emissions testing and compliance. Emissions from these vehicles will be modeled without an I/M program.

Since the rural areas are not covered by either MPO's travel modeling, the vehicle speeds will be assumed to be the posted speed limit. Specifically, freeway emissions will be modeled at 65 mph, arterial emissions will be modeled at 45 mph, and local traffic will be modeled at 20 mph. Ramp volumes will be included with freeway facilities in rural areas.

The four time periods used to describe traffic congestion and resulting variations in vehicle emissions in the urban areas do not apply to the rural areas. It is assumed that traffic congestion is not a factor in the rural areas, at least not to the extent that vehicle speeds and emissions would be significantly affected. Therefore, hourly vehicle emissions in rural areas will be treated as uniform in the model. ***[How and by whom will boundaries between urban and rural areas be determined?]***

- "Rural" as used here refers to the portions of the study area not within the metropolitan planning area of either MAG or WFRC.

MOBILE5b Input Files

A summary of the MOBILE5b input parameters for each county is included in Appendix C. Input parameters that may change from one county to the next include: start year, first model year, last model year, ATP, RVP, cut points, stringency, waiver rate, compliance rate, fuel type, and vehicle model year data. For the attainment inventory, a specific episode in February 1996 will be modeled. For the projection inventories the input files will be adapted to reflect changes in the local I/M programs, vehicle standards, and other parameters as they are evolve over time. Sample input files for MOBILE5b for each county are also included in Appendix C. ***[Reminder: Create a table that shows each input into the MOBILE5b and PART5 models and label each input for readers who are not familiar with these models.]***

- Post the MOBILE5 users guide on the website.

Temperatures

Temperature data will be obtained from the Division of Air Quality. For the attainment inventory, a daily minimum and maximum temperature for the February 1996 episode will be defined for each county. For the projection inventory the same minimum and maximum temperatures defining the February 1996 episode will be used.

Calculating different emission rates for temperature changes over the course of a day is not recommended. MOBILE5b is designed to produce daily emission rates for a region. ***[MOBILE6 will be designed to produce daily, if not hourly, emission rates. Modelers should plan inputs for the MOBILE6 model NOW so we can make use of the new features of the model.]***

- I believe emission rates will still be in grams/mile with MOBILE6. What changes in inputs did you have in mind?

The temperatures to be used in each county for the attainment inventory and the projection inventories are outlined in Appendix D.

Jeff Houk - 1

I have some early comments and questions on the protocol:

1) I'm not clear about this idea of using MOBILE6 correction factors to adjust the MOBILE5b results. Is the idea to a) submit a SIP using an adjusted MOBILE5b, or b) just model with it, and then correct it using the real MOBILE6 before the SIP is officially submitted? The first approach is more problematic than the second from a regulatory standpoint. It creates a bad precedent for us (if we let Utah do it, then everyone will want to), it's not even clear that we can allow it, plus it puts the MPOs in the risky position of having to use an unapproved model for the subsequent conformity determinations.

1. The discussion on MOBILE6 options pre-supposes that we will have a final version of MOBILE6 with which to do an official inventory before officially submitting the SIP to EPA.

2) We have said that we would allow a small amount of credit (on the order of 1-3%) for the diesel I/M program, just not the 20% estimated in the original SIP. Some research has undoubtedly gone on in the 11 years since the original estimate was generated, and it may be useful to revisit this issue to see if more credit is available.

2. My assumption is the credit for diesel I/M will be evaluated during the control strategy phase.

3) The PART5 section indicates that indirect SO4 will be one of the model outputs used. I presume the modelers would rather get direct gaseous SO2 emissions out of the model for use as a UAM model input.

3. The reason I listed indirect SO4 particles as an output from PART5 rather than the gaseous SO2, is to keep the inventory budget consistent with conformity procedures. PART5 (p. 14) assumes that 12% of SO2 reacts to form SO4. If the UAM model produces some other reaction rate for SO2, how would we model that for conformity without running the UAM model?

Sulfur vs. sulfate: Brock and the rest of the modelers should probably look at the "Sulfate Emission Factors" section of the PART5 User's Guide and decide how this should be handled. Maybe the direct sulfate emissions could be added to the particulate emissions budget, and there could be a separate budget for gaseous SO2. UAM will be used to model the conversion of gaseous SO2 to sulfate in the modeling domain, so I don't think it's a good idea to rely on the model's default conversion rate of 12%.

4) Whatever happened to the silt loading data that were collected as part of the original SIP development effort? I would think that these would be more appropriate than using silt loading data collected in other parts of the country. For example, there are lots of data available from Colorado, but Colorado uses an 80/20 mixture of sand and salt on the roads in the winter, while in Utah, I'm told it's the opposite. Montana also has loads of data, but their older data reflect the use of massive amounts of sand which stayed on the road for weeks until the ice melted. Their newer data reflect the use of chemical deicers. Unless there is a good justification as to why some other area's silt loading data are appropriate for use in the Utah SIP, it's probably better to rely on the old Utah data or the model's defaults.

4. The silt loads being used are freeway (& ramp) - 0.10 g/m2, arterial - 0.14, and local 0.29. I got the silt loads from DAQ and understood they were PART5 default values. Maybe they are Utah values, but Salt Lake and Utah counties can't very well have the same silt loads since one sands and the other uses salt. Road dust is a big part of the inventory so we need to be careful of how it is measured. It will be helpful to get Sonoma's literature search on this issue to see how the values we are using compare to other areas in the nation.

Silt loading: I agree that it's a good idea to do a reality check on the silt loading values being used. However, I still think it would be advisible to use the data collected for the previous SIP in Salt Lake County unless there's a good reason not to. All of our guidance strongly recommends collecting local data.

5) The I/M program inputs for the base case modeling should capture as accurately as possible the I/M programs that the Counties actually had in place

in the year prior to February 1996, which are different from the current designs in some cases.

5. The I/M programs defined in the mobile source protocol attempted to describe the county programs for 1996 as well as all other years to be modeled. Any inaccuracies in the protocol need to be identified and corrected.

6) How will the emissions impact of out-or-area and out-of-state vehicles travelling within Salt Lake and Utah Counties be modeled?

6. Out of state "thru" trips are included in the VMT estimates. Modeled VMT is calibrated to UDOT traffic counts (HPMS). Specific characteristics of out of state vehicles are addressed to the extent that national defaults of VMT mix and vehicle age distribution are used in the MOBILE5b model.

Out of state "thru" trips: My concern was not about how they were handled in the VMT and VMT mix data, but how they were being treated for I/M purposes. I assume they're going to be modeled as non-I/M vehicles, like the vehicles in the outlying counties are.

7) Do HD vehicles (like OTR trucks) represent a higher proportion of VMT during the non-peak periods? Is it worth it to try to generate a different VMT mix for use during these hours?

7. We don't have local VMT mix data. I think it would be worth the effort to test the sensitivity of truck volumes and speeds by time of day. The control strategy phase may be the most appropriate time to investigate this.

8.The only thing I can think of to add at the moment is to try to find out what the refiner's plans are with respect to phasing in low-sulfur gasoline. Sulfur content has a significant impact on emissions, and especially NOx emissions, in MOBILE6. At 600 ppm sulfur, there's almost a 200% increase in NOx emissions for the newest technology vehicles. Also, there's a direct SO2 benefit from reducing gasoline sulfur that you may be able to take credit for even before MOBILE6 comes out. It would be useful to try to get 1996 information and estimates of future sulfur content for use in MOBILE6 when it's available.

8. Sulfur content of fuel could also be a significant factor in future emissions. I will talk to DAQ about getting sulfur information from the refineries. Of course, without MOBILE6 we can't evaluate these impacts. What about federal legislation for sulfur in fuels?

Sulfur in fuel: I don't know of any pending federal legislation, just the Tier2/sulfur in gas rules we finalized. However, if any of the suppliers over there are planning on phasing out sulfur early for marketing reasons or some other reason, that would be useful to know. You may be able to take credit for a reduction in SO2/sulfate emissions in advance of MOBILE6, as was done for the diesel sulfur rule in the last SIP, but you're right, you probably can't calculate credit for any of the other tailpipe pollutants without MOBILE6.

9. I have one other item, and I don't know whether it belongs in the mobile source protocol or somewhere else. A couple years ago OMS issued a policy memo that said that if your SIP includes an emissions inventory for transportation-related construction, then that creates a budget that has to be analyzed as part of conformity. This implements section 93.122(d) of the conformity rule. The current SIP doesn't contain such a budget that I can tell, but if fugitive dust from highway and transit construction is a significant contributor to the PM10 problem, creating a budget for it in the new SIP would be one way to regulate it. This is optional, not required. Fugitive dust from all construction activities should be included in the inventory, of course, but you're not required to specifically break out highway and transit construction and create a budget for it.

- I-15 and light rail construction began after the 1996 base year and both will be completed before our SIP.

10. OMS is still working on their policy on using national defaults vs local inputs for the vehicle age distribution inputs in the MOBILE model. How do the 1992 data you're using for Salt Lake County compare to the 1990 defaults in terms of the result? Do the 1992 data result in an older or newer fleet? Also, do you have a sense of which data are probably more representative today? My sense is that the vehicle fleet in Salt Lake is probably newer on average than it was in 1992, given the booming economy, but that's just a guess.

- Local vehicle age distribution is incomplete and inconsistent. No data from Davis or Weber. Utah County seems to use a different definition for LDGT1 and LDGT2 than Salt Lake. HDDV is default anyway. We will discuss this again at the 3/6 meeting.

Bob Kaiser

Draft 2/2/00 Mobile Source Inventory Protocol

In general, specificity in this protocol will alleviate potential misunderstandings, provide a basis for replication, and provide a basis for control strategy identification and analyses. It is suggested that each transportation demand and emissions model run (model set and data bases) be archived in electronic and paper forms for potential use in later project phases.

Statements regarding the data sets and models to be used for the 1996 PM-10 episode and future year projections (e.g, transportation model sets as of March 1, 2000 [page 8]; MOBILE5b) are excellent means to specify what will be used and avoid potential misunderstandings. They are suggested to be prominently located in the first section of the Protocol.

- Will add a reference or resource section for the next draft.

Transportation Models

- The protocol states that the transportation model set as of March 1, 2000 (assumed to be, but not stated as the MPO's adopted model as of this date) will be used for modeling 1996 and all future episodes. The name/number/version of this model should be specified, with a brief description (e.g., MINUTP model version x.y, adopted by the (agency) on (date). This is a _____ (i.e., AM peak period model approximating summer weekday conditions).

It is unclear from the current description if this 'current' model is the:

- Pre-2000 model set, MINUTP, separate for WFRC and MAG areas
- Early 2000 combined model set , including feedback loops and certain other improvements as listed in the 1999 Peer Review
- Other model and data sets

-1996 base year travel models runs will use WFRC/MAG data sets and procedures as they exist on March 1, 2000. 1996 VMT is controlled to UDOT's HPMS values. Projection years will use the May 1, 2000 travel model which will included an upgraded mode choice model. Projection year VMT will be adjusted using the HPMS/VMT functional class factors determined for 1996. The regional travel model as applied can be described as a four period traffic assignment approximating average annual weekday conditions. Winter adjustment factors are used to correct the VMT to the February episode conditions.

The travel model assigns trips to the network using an equilibrium assignment process. In this feedback process, link speeds are adjusted according to the capacity and assigned volume for each link resulting in new travel times. This process is repeated until travel times reach an equilibrium point at which there is no ability to improve travel path costs (time) without degrading travel path costs in other parts of the network.

- The following is suggested regarding transportation demand models and associated data:

WFRC and MAG are in the midst of a significant transportation model update at the time of the PM-10 SIP development process. The current transportation demand model and associated data bases (name / number / version) will be used to estimate 1996 base conditions.

Future transportation model sets and versions thereof are anticipated to be delivered to and refined by WFRC and MAG commencing in Spring 2000. These may or may not be finalized and adopted by the MPOs in time for use in this PM-10 SIP development effort. These may be utilized if they are adopted by the MPOs in sufficient time to be used, and are considered likely to provide significantly improved results over the initial models used.

It is not the intent of WFRC and MAG to remodel earlier efforts if subsequent models/data sets are utilized for portions of the SIP development process. All model and data sets utilized will be fully documented and copies archived in electronic and paper form.

- Will incorporate similar language in next draft.

- The introduction may include clarification that the transportation demand models predict / replicate travel demand, which is then apportioned to various motorized and non motorized modes. As such, non-motorized trips zero emission trips are represented in model outputs, but are not modeled for emissions purposes.
  - Will add this calcification to travel model section.

- It is unclear what data inputs to the transportation model will be used. Actual 1996 data, such as the 1996 survey data matched to 1996 HPMS and other county data, as available, is suggested for use in the 1996 base model runs. MPO-adopted data should be used for future year projections, consistent with USDOT and USEPA requirements regarding latest planning assumptions (FHWA/FTA metropolitan planning and EPA conformity regulations).
  - The 1996 travel model runs are based on the "1995 Surveillance of Socio-Economic Characteristics Report" as stated in the protocol. Modeled VMT from 1996 will be corrected to the 1996 HPMS control total by functional class. Projection years will be based on the "2000 Economic Report to the Governor" as noted in the protocol. This data is reduced to the TAZ level by WFRC and MAG. The 1996 HPMS/model VMT functional class factors will be applied to projected VMT.

- A statement regarding the model's inclusion of all classes of motor vehicles, from motor cycles to heavy trucks, is suggested.
  - Noted. For emission model section.

- A statement regarding the absence of a specific truck / commercial motor vehicle freight model is suggested.
  - Noted. WFRC adds a "commercial" trip purpose table, MAG does not. Will elaborate in next draft.

- 1996 VMT and speeds are suggested to be output using the region's official modeling tools, adjusted as appropriate to match empirical data from HPMS and potentially other state and local data sources. These should reflect conditions typical for the February 1996 PM-10 episode(s) to be modeled. Use of only HPMS may not be reflective for some functional classes (e.g., the HPMS data set excludes local roads).
  - In the urbanized areas (Utah, Salt lake, Davis, and Weber Counties) HPMS does include local roads. HPMS data for 1996 is considered the control total for VMT. Local VMT in rural areas is an issue for UDOT. Will address this at the 3/6 meeting.

- Clarify how speeds will be calculated by facility class, as several methods exist. These include:
  - Areawide v. county-based
  - Calculation by time period
  - Daily totals apportioned to time periods
  - Individual links
  - Speeds are calculated by city, county, time period, and functional class as vehicle miles traveled divided by vehicle hours of travel. Links with the same functional class will be assigned the same speed for each time period.

- Local roadway speeds of 20 mph appears reasonable. An analytical basis for this figure should be stated or referenced, since the transportation models do not calculate the data.
  - WFRC and MAG have always used 20 mph as the local model speed. The basis for this is that posted speeds on local roads is 25 mph. Considering stops, 20 mph is a reasonable average speed. The local speed is assumed constant during all time periods because congestion on local streets is uncommon.

- The use of 4 functional classes, freeways, ramps, arterial streets and local facilities is appropriate.
  - Noted.

- The use of 4 weekday speed periods - AM peak, mid-day, PM peak and off-peak - for each roadway functional class is appropriate. The time periods should be defined in the transportation modeling section by the actual hours bracketing each, and should add to 24 hours per day.

  The analytical basis for weekend time period assumptions should be stated or cited in the transportation modeling section.
  - Time periods have been adjusted to sum to 24 hours. DAQ has indicated that weekend base year emissions are not a significant part of the episode. Traditionally travel modeling has focused on weekday traffic. Given the lack of weekend data and limited demand for rigorous weekend traffic data, a simplified means of converting weekday traffic to weekend conditions was sought.

- Clarification of how constrained (congested) speeds will be derived for future modeled years using volume to capacity rations and successive model iterations (feedback). Using the area's approved transportation model, the

possible approaches include area-wide aggregation for each functional class by time period, sub-area aggregations, consideration of signal density by link, etc.

Clarification of how unconstrained speeds will be handled is suggested (e.g., totally unconstrained, capped at speed limit, capped per empirical values, capped at speed limit + X mph, differentiated by vehicle type, etc.).

-The travel model assigns trips to the network using an equilibrium assignment process. In this feedback process, link speeds are adjusted according to the capacity and assigned volume for each link resulting in new travel times. This process is repeated until travel times reach an equilibrium point at which there is no ability to improve travel path costs (time) without degrading travel path costs in other parts of the network. The relationship between speed and congestion (volume/capacity ratio) is defined by the traditional "BPR" (Bureau of Public Roads) curves for each functional class as defined in the 1994 Highway Capacity Manual.

Free flow speeds are capped at empirical values which are based on 1994 HCM estimates of speed. Factors considered in deriving the HCM speeds are number of lanes, area type, and functional class. The HCM based speeds are typically somewhat less than posted speeds. WFRC and MAG are engaged in a speed study at the time of this writing. Historically, freeway free flow speeds used in the model have been an issue. WFRC hopes to have sufficient data to validate freeway free flow speeds prior to modeling 1996 base year conditions. Free flow speeds for other facility types will also be checked within the same time constraints.

- If a significant volume, through vehicle trips may be important in that they represent a cold start outside the area, removing a significant portion of emissions from the study area. Our information indicates that through trips (both origin and destination outside the study or modeled area) represent a very small proportion of area motor vehicle travel and therefore is deminimus. It is unclear if there exists a substantial proportion of such trips in the modeled area. The protocol could provide this quantification or suggest research of this issue.

  Similarly, vehicles from outside the modeled areas may enter the study area: such vehicles have the potential to emit significantly more emissions than those vehicles included in the local I/M systems or regulated fuel supplies. Without sufficient data, such as license plate surveys coupled with origin/destination data, accounting for such vehicles is likely impossible, and in any event introduces significant transportation and emissions model complexities. Absent existing data to the contrary and considering the relatively isolated nature of the study area, it is suggested that this issue is deminimus in nature and need not be addressed.

  - Thru trips and external/internal trips are 0.4% and 0.2% respectively of the regional trips. If these vehicles are not subject to I/M controls they could emit at a higher rate than vehicles in the urban area. Some of this marginal emission increase will be captured by modeling emissions from the rural portions of the study area that surround the four urban counties. Rural vehicle emissions will be estimated without I/M controls. Trucks are likely a significant portion of these two trip types and truck emissions are not affected by I/M programs.

Areas Not Incorporated in MPO Transportation Models

The 2/2/00 Draft Protocol provides some information regarding modeling of rural areas outside the MPO travel models (pg. 21). It is unclear if this applies to rural areas included in the MPO areas, or to those outside MPO boundaries.

- "Rural" refers to portions of the study area outside WFRC and MAG metropolitan modeling domain. The MPO modeling domain included Weber, Davis, Salt Lake, and most of Utah Counties. There is a question regarding the portion of Utah County outside the travel model. MAG and UDOT will need to determine how the VMT in this area is collected.

- It may be possible to avoid time of day modeling efforts should count or population data reveal that the volume of rural area traffic, as a surrogate for emissions, is deminimus relative to urbanized area traffic.

  - Rural area traffic speeds will not vary by time of day. The rural area speeds are defined in the protocol. UDOT will estimate a daily VMT total for the rural areas. This daily VMT will be allocated temporally based on the percentage of VMT by time period in the urban areas.

- Data regarding volumes, speeds, vehicle types is usually available through HPMS and other state sources. Use of existing empirical data, as available, is suggested. In particular, speeds are influenced by signal densities and terrain, and are not necessarily reflected by the posted speed limits.

  - I assume this comment refers to the rural areas. I believe the level of detail proposed for rural speeds and VMT is appropriate for the relative significance the rural areas have on emissions. If inventory calculations prove otherwise we may need to apply a more rigorous approach to rural emissions at that time.

Absent speed information by functional class (e.g., HPMS data may be limited to expressways), a sample average of speed limits by link by functional class may be used to derive an average travel speed. Speeds on local roadways may be calculated as described for areas with transportation demand models.

Mobile Source Emissions Modeling

Weekday Vehicle Emissions

- Correct hours for free-flow period (page 15) to: 11 hours from 7:00 pm through 5:59 am.
  - To be updated in next draft.

- Distribution of VMT (free flow) during the evening/early morning time period may be apportioned based on VMT distribution in HPMS and/or other UDOT reports.
  - Closer examination of the 1993 Home Survey suggests that 90% of the "Free Flow" (6:00 pm to 6:00 am) period traffic occurs from 6:00 pm to midnight, the other 10% from midnight to 6:00 am.

Weekend Vehicle Emissions

- The analytical basis for these assumptions should be cited.
  - DAQ has indicated that weekend base year emissions are not a significant part of the episode. Traditionally travel modeling has focused on weekday traffic. Given the lack of weekend data and limited demand for rigorous weekend traffic data, a simplified means of converting weekday traffic to weekend conditions was sought.

Vehicle Emissions Model - MOBILE

MOBILE5b will provide superior results to those from MOBILE5a, and should reduce the modeling effort necessary. This will result in MOBILE5b for PM-10 conformity (winter conditions) and MOBILE5a for ozone needs (summer), until MOBILE6 becomes available and pre-existing SIPs are re-modeled with this tool. (MPOs will not be able to switch to MOBILE5b for ozone modeling unless a new ozone SIP is developed – likely a short term issue pending implementation of MOBILE6 and recalculation of all SIPs).

- Pending a final model code being compiled, estimates of MOBILE6 outputs are speculative. It is possible, however, that some elements may become useful for estimation purposes prior to release of the final MOBILE6 model, although none exist at this time. The numerous draft components of MOBILE6 that do exist are not yet finalized, and their combination into a modeling chain is not yet completed. As such, it is likely premature at this time to specify a methodology for approximating MOBILE6 outputs, and a more general approach is appropriate in the Inventory Protocol.

  The following language for the Protocol is suggested regarding MOBILE6:

  > Pending approval of MOBILE6 as a final, regulatorily-required model, the PM-10 SIP development effort will proceed using MOBILE5b as the mobile modeling tool. As interim versions of MOBILE6 or other approximation tools may become available during the course of the PM-10 SIP effort, these will be considered for use to determine the extent of any change in emissions results between MOBILE5b and MOBILE6. The SIP preparation team will determine a proper course of action at that time.
  >
  > Should MOBILE6 become a final tool per USEPA during the course of the SIP development process, then the SIP preparation team will determine an appropriate course of action to accomplish the completion of this SIP effort in final and approvable form, minimize reiterative modeling, and minimize or negate any associated negative impacts.

  - Will revise MOBILE6 discussion as necessary.

Emissions Model Chain

- The protocol is suggested to state the emissions modeling chain for the various counties encompassed in the MPO transportation model sets. It is unclear if each county will be modeled separately, or if regional parameters are derived and applied to the entire area for MOBILE5b and PART5.
  - Each county is modeled separately since the I/M programs vary by county. Speeds will also vary fromone county to the next, and therefore emission rates will vary from county to county for the same functional class and time period. Will clarify.

Spatial Allocation

- Spatial allocation appears to be accomplished under the same process for both MOBILE5b and PART5 outputs. The consultant team has not reviewed this methodology.
  - Noted.

Past Episode(s) - MOBILE and PART5 Models

The Inventory Protocol is suggested to delineate, both in MOBILE and PART5input sheets and brief explanations, the settings and inputs to be used for modeling the February 1996 PM-10 and any other past episode(s). Data sources should be identified by source, age, and other relevant parameters.

- We will need DAQ assistance to document many of the data sources such as temperatures, fuel RVP, etc.

These modeling runs replicate existing conditions and programs during the PM-10 episode(s), regardless of the final goals, such as SIP claims.

County or region specific data should be used where ever possible, consistent with EPA guidance and data availability. In particular:

- Vehicle age distributions – modeled per 1996 registration distributions at the county or regional level of detail (see HDDV, below).
  - EPA default data is proposed. This is appropriate (except HDDV) only if local data is not available. Age distributions are highly localized, and can exert substantial emissions impacts, both in the base year and future projections.
  - HDDV are suggested to be modeled at national default distributions, per EPA guidance and absent any local-specific data.
    - We will need to have this discussion again at the 3/6 meeting. There is concern about incomplete and inconsistent local vehicle age data.
- Vehicle type data – modeled per 1996 distributions at the county or regional level.
  - EPA default data is proposed. This is appropriate only if local data is not available. Local data from registration records and field counts enhances emissions outputs to account for actual fleet parameters, particularly if vehicles other than LDGV are prevalent both in the vehicle registration data base and in usage rates.
    - Utah registration data does not accurately record odometer data or vehicle type (as used by MOBILE5b). No field studies are available.
- Vehicle speed inputs - Proposed to be one speed for all vehicles in each functional class/time period scenario. This is appropriate absent local data. May result in overestimation due to lower speeds actually incurred by heavy trucks on upgrades and on heavily arterial roadways streets. Differentiation of speed by vehicle type, functional class and time period is suggested.
  - Noted, but no basis for making speed adjustments by vehicle type at this time.
- Fuel type and volatility. It is possible to model fuel RVP, oxygenate use, and RFG. Fuels that may have different parameters than allowed, such as lower sulfur content, may be difficult or impossible to model inside the main modeling chain and may be handled as an off-model adjustment. Local values may be input, although the EPA models may ignore or default to another value.

  Absent large numbers of or miles incurred on alternatively fueled vehicles, this item may be considered deminimus for inventory purposes.
  - Noted.
- I/M Programs – Inputs for the each of the county programs in existence in 1996 (and other desired years) were used in the SIP modeling for the I/M program and may be extracted from the modeling input sheets. Pre-1998 programs all appear to be basic idle tests conducted in a test & repair program design. This should simplify modeling pre-1998 episodes.
  - Differences among the Davis, Salt Lake, Utah and Weber County programs may be examined to determine if these differences produce significantly different results in the context of regional air quality modeling. If results are similar despite minor program differences, we suggest that modeling may be expedited and simplified by inputting one program type for all such counties.
    - There may be another approach, but I have designed the MOBILE inputs to produce emissions for a given county and varying I/M programs for all years, 1996-2050, in a single input file. The output is then converted to a lookup table. I recommend keeping the county input/output files separate.

- Utah's I/M modeling simplification methods appear to have EPA approval. If so, their use in this modeling effort is appropriate.
  - Noted.

- PART5 inputs for silt loads are suggested to be consistent with local practice, which varies by county. A review of prior data / studies and 1996 practices by UDOT and by County are suggested to determine the values to be used. Absent local data, data from similar areas should be evaluated for potential utility. EPA default data may be used if above sources are insufficient.
  - See response to J. Houk above. Will discuss at 3/6 meeting.

- Weather data should be for observed conditions on the episode days/months, or annual data from UDEQ or EPA, and should be consistent with inventory estimation procedures for all emissions sources.
  - Working with DAQ for this data. DAQ has suggested using different temperatures for each county as observed during episode, rather than lumping rural counties into common temperature groups. Precipitation days for PART5 modeling will use the DAQ number from past applications.

Future Year Projections - MOBILE and PART5 Models

- The following should be forecast for future years using the same methodology as for the 1996 episode(s):

  Traffic conditions (volumes and speeds by FC by time period)
  Vehicle age distribution
  Vehicle type distribution
  Spatial allocation
  Vehicle speed inputs

  - Volume and speed forecasts are the function of the travel model. Rural VMT estimates will apply grow rates similar to urban area aggregate rates, or rural area population growth rates as appropriate. Spatial allocation in the urban area is accomplished with proposed future transportation networks. Spatial allocation of rural projections could be fixed at base year locations unless these emissions prove to be more significant than anticipated. I am not aware of any data for projecting local vehicle mix or vehicle age data, another reason to use defaults.

- The following will forecast by EPA modeling tools from base input conditions (1996, see above).

  Vehicle type distributions (also see Tier II, below)
  Vehicle age distributions

  - Another reason to use defaults.

- Fuel Type and Volatility - Inputs should include only those items in approved SIPs or approved federal control measures (also see low sulfur fuels, below).

  Absent large numbers of alternative fuel vehicles, this issue may be considered deminimus for base and uncontrolled future year inventory purposes.
  - Utah County uses oxygenated fuel in the winter. Winter RVP values for the study area are outside the MOBILE5b maximums.

- I/M Programs – the I/M programs envisioned for future year(s) projections should be those as claimed in the area's approved I/M SIP, accounting for any phase-in of certain aspects (e.g., EPA final cutpoints). It is anticipated that all likely forecast years (post 2000) will include achievement of final I/M program parameters (stringency, waiver rates, etc) and may be modeled as such.
  - I am not aware of any future modifications to the I/M programs other than what is described in the protocol appendices. Any guidance from DAQ in this area would be appreciated. OBDII has been discussed but EPA has not provided modeling guidance.

  - EPA-approved modeling simplification (complex hybrid systems and 4 different county-based systems) approaches may be used to reduce modeling efforts.
    - Any expertise on simplifying Davis and Salt Lake hybrid programs, Utah County also, would be most appreciated. Can two I/M programs in a county be modeled simultaneously, or do they need to be evaluated successively as we have done in the past in order to replicate the hybrid program?

- The following are applicable to post 1996 Projections:

  NLEV (see EPA supplementary input files)
  Heavy Duty Diesel 2004 Rule (see EPA supplementary input files)
  Tier II Vehicles (see EPA separate calculation methodology)

Low Sulfur Fuels (included in Tier II vehicles methodology)
OBD I
OBD II (pending EPA final calculation methodology, expected summer 2000)

- NLEV and HD 2004 are included in the vehicle emission modeling for the entire study area. As for the last four credits, I have not seen any documentation from EPA on modeling these. These should be added as soon as they are available, provided it is not too late in the process.

utah/invent/msprotdft.doc

Peter's Comments

NEW COMMENTS AND ISSUES
PM10 SIP: ON-ROAD MOBILE SOURCE EMISSION INVENTORY

March 1, 2000

1. Credit for On-road Diesel Programs (I/M and Opacity)
EPA 8 can advise us about the approximate credit the counties should receive for testing of the on-road diesel vehicles. This includes two-speed idle or loaded mode on the light- and medium-duty diesels and opacity testing on the HDDs.

2. PART5 Silt Loading Factors
We've located the study that DAQ performed on various roadways in Salt Lake County during winter 1990-1991. The study reports two sets of silt loading factors. We need to decide which set of factors (or perhaps an average of the two) should be used as inputs in the PART5 particulate model.

Also, Sonomatech is performing a literature search to see if there are any other studies on silt content and silt loading that might prove useful. They have copies of the DAQ study.

3. Number of Precipitation Days in 1996
The PART5 model requires that we input the number of precipitation days per year (1996) during which at least 0.01" of precipitation was recorded. Mobile sources will find and report this data for each of the 13 counties in the PM10 study area. Air Monitoring Center has both archived and current copies of the "Local Climatological Data" publications that report temperature and precipitation data for scores of monitors in Utah.

4. Temperatures for 1996 Episodes
Daily average max/min temperatures have been gathered from all monitors in the 13-county study area. Preliminary temperatures for the four-county area have already been reported to the MPOs (a decision was made about specific monitors to use, but this choice can be changed if desired). The air modelers will choose which monitors best represent each of the outlying counties. We will report the data to the MPOs asap.

5. Vehicle Registration Distribution Matrices
a. We have three choices:
1) Use national default vehicle registration matrices from MOBILE5
2) Use local data from the Salt Lake and Utah County I/M programs.
3) Wait for the revised vehicle registration matrices in MOBILE6.

b. Note that we don't have local data from the Davis County program--use the same data as for Salt Lake County.
c. Are there local vehicle registration distribution matrices from Weber County?

6. New Basic Emission Rates for HDD Vehicles
For guidance, refer to "Info Sheet No. 5" which supplements the MOBILE5 model. Some of these "new" emission rates go back to 1990, so they should apply to base year (1996) modeling as well as to future years. This affects only the heavy-duty diesel vehicles.

7. NLEV Begins with Model Year 2001
NLEV should be modeled for all projection years beginning 2001. NLEV affects light-duty passenger gasoline vehicles (LDGVs). Will NLEV apply to light-duty trucks I and II (LDI and

LD2) of model year 2001 as well?

8. Test-only versus Test-and-Repair
EPA determined that the new Utah County I/M program (beginning 1999) should receive 100% credit towards a test-only program. This means that their program merits a greater amount of credit than in the past. Therefore, in future year modeling (1999 and on), the Utah County I/M program should be modeled as "test-only" in the MOBILE5b model. The test-only flag is indicated in two places: 1) in the I/M program descriptive record, and 2) in the ATP record.

There is still one question that we have about modeling of a "test-only" program: Do we also enter the so-called "I/M Program Effectiveness Record" and indicate full credit for each element of the I/M program, or do we merely change the flags from "test-and-repair" to "test-only" in the I/M Descriptive Record and the ATP Descriptive Record? Ask OMS or EPA 8.

9. I/M Control Flag Record
MOBLE5b contains a new record that was never in any of the earlier versions of the MOBILE model, the I/M Control Flag Record. Input consists of four one-digit numerals (with one space between each numeral) that must be input as either a "1" or a "2". The input should read as follows: 1 1 2 1

1 1 2 1 means:
1 = only one I/M test procedure in place
2 = do not assign emission credits based on assuming a specific I/M program for Tier I vehicles (Tier I vehicles are model year 1994-2003). None of the I/M programs perform a different test procedure on Tier I vehicles.
2= apply technician training and certification credit (TTC) beginning in evaluation years 1998-on. These credits do not apply during the base year (1996). The modeling of TTC is identical in all four counties.
1 = do not assign credit for Remote Sensing Devices (RSD).

10. Alternate I/M Credits
See the I/M Program Descriptive Record. There is a cluster comprised of four digits that follows the compliance rate (which is usually 96 or 97%):

For example, if the I/M program is two-speed idle and test-and-repair, the following digits are used: 2111 (no spaces between digits)

The four digits indicate the following:

2 = test-and-repair

1 = use default cutpoints

1= do not use alternate I/M credits (for Tech I-II vehicles)

1= do not use alternate I/M credits (for Tech IV+ vehicles)

Change the input to 1111 if the program is "test-only" (Utah County beginning in 1999 only).

For the ASM test, the following flags should be set: 5211, where the digits indicate:

5 = ASM test

2 = use default cutpoints
1 = do not use alternate I/M credits for Tech I and II vehicles
1 = do not use alternate I/M credits for Tech IV+ vehicles

Change the above input to 4211 if the test procedure is I/M 240.

Note that the flag settings are NOT consistent between MOBILE5a_H and 5b.

11. Cutpoints
a. Check with OMS or EPA 8 on use of proper cutpoints. Previous modeling of ASM-2 and IM240 used the following cutpoints:

0.80 = hydrocarbons (aka volatile organic compounds) in grams per mile
15.0 = carbon monoxide in gm/mi
2.00 = nitrogen oxides (gm/mi)

Are the above cutpoints "startup", "default" or "final"?.

b. Default cutpoints for two-speed idle may be omitted from the input--the model assumes these are default unless user specifies otherwise.

c. Salt Lake County is using startup cutpoints. Is there a plan to move to default or final cutpoints?

12. ATP
ATP is test/repair except beginning in 1999 in Utah County, where the ATP is also considered "test-only". "Test-only" gives more credit than "test-and-repair".

13. Adjustment of 1996 VMT
UDOT adjusted 1996 annual VMT upwards. This will require that the on-road mobile sources portion of the periodic three-year emission inventory for 1996 be revised to show the revised VMT for 1996-on.

14. Proposed Changes in I/M Test Procedures
We plan to model the Davis County program as the Ozone MP dictates, so, to be consistent, we should model the Utah County program the same way, i.e., do not model proposed changes such as replacement of the tsi test procedure with OBDII for the newer model years. EPA still has not assigned credit for OBD testing in I/M programs. We should delete the wording that describes the new elements of the Utah County I/M program from the "Mobile Sources Emission Inventory Draft Protocol" until credit for these test procedures becomes official.

15. Modeling of Davis County I/M Program
Can MOBILE5b be used in place of MOBILE5a_H to perform the modeling for the Davis County I/M program?

Yes. Both MOBILE5a_H and 5b allow two I/M test procedures to be modeled simultaneously, which is necessary in order to properly assigning credit for the Davis County program. The input files are quite different, though, and the actual program is more easily modeled in 5a_H. Nonetheless, EPA will have to approve the modeling all over again because previous work was modeled using MOBILE5a_h, while future modeling will use 5b and/or 6.

Unfortunately we cannot demonstrate to EPA that we will never violate the 8-hour ozone standard. Data from 1997-1999 show that we may be in violation of this standard (depending on how data values are rounded). In any case, we are either in violation or just very slightly below a violation with our 3-year average at several monitors in Davis and SL Counties.

Any ideas on ways we can more simply model the Davis County I/M program would be appreciated. The previous modeling work required over 180 separate MOBILE runs. Two of these runs required inputs covering a 28-year period.

16. Modeling of Salt Lake County I/M Program
Can MOBILE5b be used in place of M5a_H to model the Salt Lake County I/M program?
Yes. MOBILE5b is capable of doing everything that 5a_H did.

QUESTIONS ABOUT TRAVEL DEMAND MODEL

17. Is HPMS in any way refined (changed) by the travel model?
Not sure. In Section 7 of WFRC Travel Models Documentation (Jan 2000), it is mentioned that HPMS VMT is compared to modeled VMT. It is not clear whether HPMS VMT is adjusted if the comparison shows significant differences.

18. Identification of Links by Travel Model

a. Can the travel model identify "links" for which emissions in MOBILE6 can be computed?
Ask MPOs.

b. Can the travel model subdivide VMT between different peak traffic periods during a given day? For example, can the model assign VMT to a particular stretch of roadway as follows:

"Link at I-15 and I-215 Interchange"
AM peak 75% of weekday daily VMT
PM peak 20% of weekday daily VMT
nighttime 5% of weekday daily VMT

Can this be done on a "link-by-link" basis (i.e, could the model give us a VMT breakdown as shown above for each link)?

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